

1. A method of performing corneal refractive surgery by reshaping a portion of a corneal surface comprising the steps of:

selecting a laser having a pulsed output beam of predetermined ultraviolet wavelength and having an energy level [less than] of no greater than 10 mJ/pulse;

selecting a scanning mechanism for scanning said selected laser output beam, said scanning mechanism including a galvanometer scanning mechanism for controlling said laser beam into an overlapping pattern of adjacent pulses;

coupling said laser beam to a scanning device for scanning said laser beam over a predetermined surface;

focusing said scanning laser beam onto a corneal surface to a predetermined generally fixed spot size;

aligning the center of the said scanning laser beam onto the corneal surface with a visible aiming beam;

controlling the scanning mechanism to deliver the scanning laser beam in a predetermined overlapping pattern onto a plurality of positions on the corneal surface to photoablate or photocoagulate corneal tissue; and

removing from 0.05 to 0.5 microns of corneal tissue per pulse overlapped to remove tissue to a desired depth, whereby a patient's vision is corrected by the reshaping of the corneal surface of the patient's eye using a low power laser.

24. A method for performing ophthalmic surgery, comprising:
providing a laser outputting a pulsed laser beam having a repetition rate of at least 20 Hz, and an energy level of no greater than 10 mJ per pulse from an output coupler of said laser;
applying said pulsed laser beam onto corneal tissue; and
scanning said pulsed laser beam in a substantially overlapping pattern on said corneal tissue.

25. The method for performing ophthalmic surgery according to
claim 24, wherein:

said pulsed laser beam has a repetition rate of at least 50 Hz.

26. The method for performing ophthalmic surgery according to
claim 24, wherein:

said substantially overlapping pattern is achieved using randomized
scanning of said pulsed laser beam on said corneal tissue.

27. The method for performing ophthalmic surgery according to
claim 24, wherein:

said pulsed laser beam has an ultraviolet wavelength.

28. The method for performing ophthalmic surgery according to
claim 24, wherein:

said pulsed laser beam has a spot size on said corneal tissue of no
greater than 1 mm.

29. The method for performing ophthalmic surgery according to
claim 25, wherein:

said pulsed laser beam has a spot size on said corneal tissue of no
greater than 1 mm.

30. The method for performing ophthalmic surgery according to
claim 26, wherein:

said pulsed laser beam has a spot size on said corneal tissue of no
greater than 1 mm.

31. The method for performing ophthalmic surgery according to
claim 27, wherein:

said ultraviolet wavelength is in a range of 193 to 220 nm.

SAC2
32. The method for performing ophthalmic surgery according to
claim 24, wherein:

successive pulses of said pulsed laser beam are overlapped at
least 50 percent.

33. The method for performing ophthalmic surgery according to
claim 24, wherein:

said ultraviolet wavelength is in a range of 193 to 220 nm.

34. The method for performing ophthalmic surgery according to
claim 24, wherein:

said pulsed laser beam has a repetition rate in a range of 50 to 200

Hz.

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35. The method for performing ophthalmic surgery according to
claim 24, wherein:

said pulsed laser beam is scanned synchronously with said pulses
of said pulsed laser beam.

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36. The method for performing ophthalmic surgery according to
claim 24, wherein:

an area of corneal tissue 0.05 to 0.5 microns deep is removed with
each pulse of said pulsed laser beam.

SAC2
39. A method for performing ophthalmic surgery, comprising:
providing a laser outputting a pulsed laser beam having an energy
level of no greater than 10 mJ per pulse from an output coupler of said laser; and
scanning said pulsed laser beam in a substantially overlapping
pattern on corneal tissue.

48
40. The method for performing ophthalmic surgery according to
claim 39, wherein:

said pulsed laser beam has a spot size on said corneal tissue of no
greater than 1 mm.

41. The method for performing ophthalmic surgery according to
claim 39, wherein:

successive pulses of said pulsed laser beam are overlapped at
least 50 percent.

42. The method for performing ophthalmic surgery according to
claim 39, wherein:

said pulsed laser beam is pulsed at a repetition rate of at least 20
Hz.

43. The method for performing ophthalmic surgery according to
claim 39, wherein:

said pulsed laser beam is pulsed at a repetition rate of at least 50
Hz.

44. The method for performing ophthalmic surgery according to
claim 39, wherein:

said pulsed laser beam is scanned synchronously with said pulses
of said pulsed laser beam.

45. The method for performing ophthalmic surgery according to
claim 39, wherein:

an area of corneal tissue 0.05 to 0.5 microns deep is removed with
each pulse of said pulsed laser beam.

SAC 3
48. A method of performing laser ablation on tissue, said method comprising:

providing a laser having a pulsed output beam of ultraviolet wavelength and an output energy level of no greater than 10mJ per pulse from an output coupler of said laser;

providing a galvanometer scanner; and
controlling said pulsed output beam with said galvanometer scanner to provide a substantially overlapping pattern of beam pulses on said tissue.

SAC 4
49. The method of performing laser ablation on tissue according to claim 48, wherein:

an orientation of said substantially overlapping pattern is achieved using randomized scanning of said pulsed output beam on said tissue.

SAC 5
50. The method of performing laser ablation on tissue according to claim 48, wherein:

said pulsed output beam has a pulse repetition rate of at least 20 Hz.

B 4
56. The method of performing laser ablation on tissue according to claim 48, wherein:

said pulsed output beam is pulsed at a repetition rate of at least 50 Hz.

B 5
59. The method of performing laser ablation on tissue according to claim 50, wherein:

said pulsed output beam has a spot size on said tissue of no greater than 1mm.

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61. The method of performing laser ablation on tissue according to claim 49, wherein:

said pulsed output beam has a repetition rate of at least 20 Hz.

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62. The method of performing laser ablation on tissue according to claim 57, wherein:

said pulsed output beam has a repetition rate of at least 20 Hz.

B9
69. An apparatus for ablating tissue, comprising:
a laser adapted to emit a pulsed output beam having an ultraviolet wavelength and a repetition rate of at least 50 Hz; and
a scanner constructed and arranged to control said pulsed output beam into a substantially overlapping pattern of beam pulses on said tissue.

B10
70. The apparatus for ablating tissue according to claim 69, wherein:
said substantially overlapping pattern of beam pulses has an orientation which is achieved using a randomized scanning of said pulsed output beam on said tissue.

B11
76. An ophthalmic surgery apparatus for performing corneal refractive surgery by reshaping a portion of a corneal surface, said apparatus comprising:
a laser adapted to emit a pulsed laser beam having an energy level of less than 10 mJ per pulse from an output coupler of said laser; and
a computer-controlled scanning device coupled to said laser to cause overlap of pulses of said pulsed laser beam on said corneal surface to achieve a smooth ablation of corneal tissue.

SUB C4
77. An ophthalmic surgery apparatus for performing corneal refractive surgery by reshaping a portion of a corneal surface according to claim 76, wherein:

said pulsed laser beam has a repetition rate of at least 20 Hz.

B10
Cont.
78. A method of performing corneal refractive surgery by reshaping a portion of a corneal surface, said method comprising:

substantially overlapping a plurality of ultraviolet laser beam pulses over an area of a corneal surface sufficient to ablate a depth of between 0.05 and 0.5 microns of corneal tissue per ultraviolet laser beam pulse;

said laser beam pulses having an energy level of no greater than 10 mJ per pulse from an output coupler of said laser; and

said laser beam pulses having a pulse repetition rate of at least 50 pulses per second.

79. The method of performing corneal refractive surgery by reshaping a portion of a corneal surface according to claim 78, wherein:

said laser beam pulses have a wavelength in a range of 193 to 215 nm.

B11
82. An ophthalmic surgery apparatus, comprising:
a laser adapted to emit a pulsed beam of less than about 10 mJ per pulse at an output coupler of said laser; and
a computer-controlled scanning device coupled to said laser such that pulses of said beam are substantially overlapped to achieve a smooth ablation of corneal tissue.

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84. The ophthalmic surgery apparatus according to claim 82,

wherein:

said laser is adapted to emit a pulsed beam having an ultraviolet wavelength.

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86. The ophthalmic surgery apparatus according to claim 82,
wherein:
said laser is adapted to emit a pulsed beam having a repetition rate
of at least 20 Hz.

SUB 14
90. A method for performing corneal refractive surgery by
reshaping a portion of a corneal surface, comprising:
selecting a laser having a pulsed output beam of ultraviolet
wavelength and having an energy level less than 10 mJ/pulse from an output
coupler of said laser;
selecting a scanning mechanism for scanning said laser output
beam;
coupling said laser beam to said scanning mechanism for scanning
said laser beam over a predetermined surface;
focusing said scanning laser beam onto said corneal surface;
controlling said scanning mechanism to deliver the scanning laser
beam in an overlapping pattern onto a plurality of positions on said corneal
surface to at least one of photoablate and photocoagulate corneal tissue; and
removing from 0.05 to 0.5 microns of corneal tissue per pulse
overlapped to remove tissue to a desired depth, whereby a patient's vision is
corrected by said reshaping of said portion of said corneal surface of said
patient's eye.

91. A method for performing ophthalmic surgery, comprising:
pulsing an ultraviolet laser beam having an output energy level of
no greater than 10 mJ/pulse from an output coupler of said laser;
applying said pulsing ultraviolet laser beam onto corneal tissue; and
scanning said pulsing laser beam in a purposefully substantial
overlapping pattern on said corneal tissue.

B14
Cont.

claim 91, wherein:

said pulsing ultraviolet laser beam has a wavelength in a range of 193 to 215 nm.

95. The method of performing ophthalmic surgery according to claim 91, wherein:

said substantially overlapping pattern is achieved using a randomized scanning of said pulsing laser beam on said corneal tissue.

B15
claim 91, wherein:

said pulsing ultraviolet laser beam has a wavelength of 193 nm.

100. A method for performing photocoagulation on a corneal surface according to claim 99, wherein:

said infrared laser beam is emitted by a diode laser having a wavelength in a range of 1.9 to 2.5 μ m.

Kindly add the following new claims 105 and 106.

SJ DRN
B16
--105. The method for performing corneal refractive surgery according to claim 90, wherein:

said scanning mechanism comprises a galvanometer.

--106. The method for performing corneal refractive surgery according to claim 90, further comprising:

aligning a center of said scanning laser beam onto said corneal surface with a visible aiming beam.--